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of

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for

**INTERNET BROWSING
USING A UNIFORM INTERFACE**

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BACKGROUND OF THE INVENTION

1. The Field of the Invention

This invention relates to accessing information from the Internet. In particular, the present invention relates to accessing specified classes of information using an input device and an associated user interface that uses a numeric touchpad metaphor.

2. Description of Related Art

The popularity of the Internet has profoundly improved the way people communicate by allowing users quick and easy access to information. By accessing the World Wide Web and electronic mail through computers and other devices, people now stay in touch with each other around the globe, and can access information on a virtually limitless variety of subjects.

Current methods for accessing information on the World Wide Web typically use a software program called a web browser that runs on a personal computer. Current commercial embodiments of web browser software include products such as Microsoft Internet Explorer and Netscape Navigator. During normal operation of web browsing software, a personal computer user uses a keyboard and mouse to retrieve data from the World Wide Web by manually entering a uniform resource identifier (URI) or by following links from one Web page to another. Other commercial embodiments of methods for World Wide Web access use computer software programmed into special purpose devices used specifically for accessing the World Wide Web, but which lack the general processing power of a personal computer. There are also commercial embodiments of methods for accessing World Wide Web data using display devices associated with wireless devices such as cell phones and pagers.

1 When considering the methods singly, most methods allow computer users to use
2 the components of a system they are familiar with, such as a personal computer or cell
3 phone, to access World Wide Web information. To achieve simple and flexible access to
4 World Wide Web information, software vendors have created Internet browsers for a
5 variety of computer operating systems such as Windows 98, Macintosh and Unix. In
6 addition, many vendors have developed specialized software to run on World Wide Web
7 access devices and wireless devices.

8 However, due to the multiplicity of software and devices, users are often forced to
9 use multiple devices to access World Wide Web data at different times. For instance, an a
10 user might want to access the World Wide Web in a car and at home but can not transport
11 his home computer in the car. As a result, the user uses a wireless device, having an
12 interface different from his home computer, when traveling in the vehicle. Not only does
13 the physical arrangement of the home computer and wireless device differ but the access
14 software they run differs as well. Thus, the user is forced to learn two different hardware
15 configurations and two different configurations of access software.

16 While using a variety of different methods to access World Wide Web information
17 is often satisfactory, the time required to become efficient using different methods is
18 sometimes burdensome to the user. First, accessing the World Wide Web using different
19 devices and access software burdens users by requiring them to learn more then one
20 method to access the World Wide Web. This includes requiring the user to learn the
21 individual characteristics of each method before the user can retrieve World Wide Web
22 information. Second, once a user learns multiple methods, identical keys or icons used by
23 different systems can have different meanings, which confuse the user. Third, the user
24 may want access to World Wide Web data in a uniform format when using various access

1 devices. However, methods using different devices may not be capable of doing this,
2 which also confuses the user.

SUMMARY OF THE INVENTION

The present invention relates to a uniform user interface for providing access to various types of Internet content. The interface is capable of being used on access devices, which have differing hardware and software configurations. The interface uses a numeric touchpad with each button associated to specific classes of information or directional arrows to assist in the navigation of the Internet.

When an attempt to access World Wide Web information is made, the access device that initiated the attempt may take the form of one of many heterogeneous hardware and software configurations. Because the user interface is uniform across different configurations, selection of a key from the user interface is followed by the execution of a series of acts at the access device and/or at a server to ensure that the selected key accesses a specific class of information, regardless of the hardware or software configuration employed.

When a user selects a key from among the keys on the uniform interface, the selection is translated into a request for a specific class of information from the World Wide Web. The server receives the translated request, retrieves the specific class of information, and transmits the specific class of information to the access device.

One example of the configurations for the uniform interface is that of the touchpad on a touchtone telephone. This interface can also be used on a computer system where a representation of a similar touchpad is displayed on the computer system's video display. In operation, selecting the same key on the telephone touchpad or the representation of the touchpad displayed on the video display results in a request for the same class of information.

1 Software configures the keys by associating each key to specific classes of
2 information. When the uniform interface is a touchtone telephone keypad, the software
3 configures the input signals associated with the individual keys to request a specific class
4 of information when one or more keys are depressed. Similarly, when the uniform
5 interface is generated on a the computer system video display, the software correlates the
6 keys on the displayed representation of the touchpad with specific classes of information.
7 When the graphically displayed key is selected, by clicking it with the mouse or by
8 depressing the associated key on the keyboard, the request for the specific class of
9 information is generated.

10 The software can be configured so that similar or identical keys on the touchpad on
11 the touchtone telephone and the graphically representation of the touchpad on the computer
12 system video display request the same class of information. Thus, depressing the number
13 "3" on the touchtone telephone touchpad and selecting "3" from the graphical
14 representation of the touchpad on the computer system video display result in requests for
15 the same class of information.

16 A significant benefit of the current invention is that a user can easily associate the
17 classes of information with keys on a touchpad in any variety hardware or software
18 configurations. Similar keys in different configurations request the same class of
19 information. Thus the user is only required to learn one access method, which can be used
20 on multiple platforms.

21 Additional features and advantages of the invention will be set forth in the
22 description which follows, and in part will be obvious from the description, or may be
23 learned by the practice of the invention. The features and advantages of the invention may
24 be realized and obtained by means of the instruments and combinations particularly

1 pointed out in the appended claims. These and other features of the present invention will
 2 become more fully apparent from the following description and appended claims, or may
 3 be learned by the practice of the invention as set forth hereinafter.

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BRIEF DESCRIPTION OF THE DRAWINGS

In order that the manner in which the above-recited and other advantages and features of the invention are obtained, a more particular description of the invention briefly described above will be rendered by reference to specific embodiments thereof which are illustrated in the appended drawings. Understanding that these drawings depict only typical embodiments of the invention and are not therefore to be considered to be limiting of its scope, the invention will be described and explained with additional specificity and detail through the use of the accompanying drawings in which:

Figure 1 illustrates an exemplary system that provides a suitable network operating environment for the present invention.

Figure 2 illustrates an exemplary system that provides a suitable network operating environment for the present invention where multiple access devices are included.

Figure 3 is a flow diagram illustrating a method whereby different access devices use touchpads to request specified classes of information.

Figure 4 is an exemplary representation of assigning the keys of a touchpad to specified classes of information.

DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to methods and systems for providing access devices of differing hardware and software configurations with a uniform interface, which is used to request specified classes of information from a server. The embodiments of the present invention may comprise a special purpose or general purpose computer including various computer hardware, as discussed in greater detail below.

Embodiments within the scope of the present invention also include computer-readable media for carrying or having computer-executable instructions or data structures stored thereon. Such computer-readable media can be any available media, which can be accessed by a general purpose or special purpose computer. By way of example, and not limitation, such computer-readable media can comprise RAM, ROM, EEPROM, CD-ROM or other optical disk storage, magnetic disk storage or other magnetic storage devices, or any other medium which can be used to carry or store desired program code means in the form of computer-executable instructions or data structures and which can be accessed by a general purpose or special purpose computer. When information is transferred or provided over a network or another communications connection (either hardwired, wireless, or a combination of hardwired or wireless) to a computer, the computer properly views the connection as a computer-readable medium. Thus, any such a connection is properly termed a computer-readable medium. Combinations of the above should also be included within the scope of computer-readable media. Computer-executable instructions comprise, for example, instructions and data which cause a general purpose computer, special purpose computer, or special purpose processing device to perform a certain function or group of functions.

1 The following discussion is intended to provide a brief, general description of a
2 suitable computing environment in which the invention may be implemented. Although
3 not required, the invention will be described in the general context of computer-executable
4 instructions, such as program modules, being executed by computers in network
5 environments. Generally, program modules include routines, programs, objects,
6 components, data structures, etc. that perform particular tasks or implement particular
7 abstract data types. Computer-executable instructions, associated data structures, and
8 program modules represent examples of the program code means for executing steps of the
9 methods disclosed herein. The particular sequence of such executable instructions or
10 associated data structures represent examples of corresponding acts for implementing the
11 functions described in such steps.

12 Those skilled in the art will appreciate that the invention may be practiced in
13 network computing environments with many types of computer system configurations,
14 including personal computers, hand-held devices, multi-processor systems,
15 microprocessor-based or programmable consumer electronics, network PCs,
16 minicomputers, mainframe computers, and the like. The invention may also be practiced
17 in distributed computing environments where tasks are performed by local and remote
18 processing devices that are linked (either by hardwired links, wireless links, or by a
19 combination of hardwired or wireless links) through a communications network. In a
20 distributed computing environment, program modules may be located in both local and
21 remote memory storage devices.
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I. Telephone Interface

Figure 1 illustrates a representative environment in which the method of the invention can be practiced. The environment includes access device 110, server 130, network system 150, and Internet servers 132. Although only one access device, server, and network system are illustrated in Figure 1, the general principles disclosed herein can be readily adapted to an environment including more than one access device, server or network system. Server 130 is associated with network system 150 over communication link 137. Access device 110 is associated with voice browser 119 over communication link 117, which can be a standard telephone line, a communication link provided by a cellular service provider, etc. Voice browser 119 is in turn associated with server system 130 over communication link 127. Internet servers 132 are associated with network system 150 over communications link 138. Network system 150 can be Ethernet, token ring, Arcnet, or any other network, including the Internet, by which access device 110 and server 130 can communicate with Internet servers 132. Although the methods of accessing information according to the invention can be practiced with substantially any network system 150, the invention will be described herein below in the context of the Internet and the World Wide Web. It should be understood that the general principles described herein can be adapted for use with other network systems 150.

Access device 110 includes touchpad 116. Touchpad 116, by way of example, and not limitation, is a touchpad on a touchtone telephone or may be configured similarly thereto. Keys on a touchtone telephone touchpad, such as touchpad 116, may generate Dual Tone Multi-Frequency (DTMF) signals. In a touchtone telephone that uses DTMF signals, each row and column of a touchpad is assigned a frequency, such that when a key is pressed the frequencies of the row and column associated with the key are used to

1 generate a distinguishable signal for the key. Methods for generating DTMF signals are
2 well known in the art. Access device 110 also includes audio speaker 118 by which the
3 user of access device 110 receives information from the Internet or any other network
4 represented by network system 150.

5 Voice browser 119 operates at a computer that is capable of engaging in
6 communication with access device 110 by means of a telephone link and that is further
7 capable of communicating with server 130 and Internet servers 132. Voice browser 119
8 includes voice recognition module 120, DTMF conversion module 125, and text to speech
9 module 121. Voice recognition module 120 is capable of converting verbal commands
10 into URI's or Hyper-Text Markup Language (HTML) code, while DTMF conversion
11 module 125 is capable of converting audio tones (i.e., DTMF signals), which may be
12 generated by pressing keys on touchpad 116, into URI's or HTML code. HTML code is
13 an example of electronic content that is common to the Internet. However, the invention
14 imposes no particular requirement on the type of audio signals received or the format of
15 the code into which they are converted. Software that can be adapted for use as voice
16 recognition module 120 and DTMF conversion module 125 is well known in the art.

17 Text to speech module 121 converts the text it receives to speech that can be
18 communicated to the user of access device 110. In the embodiment in Figure 1, text to
19 speech module 121 converts HTML code into speech that can be transmitted to access
20 device 110 and output on audio speaker 118. Software that can be adapted for use as text
21 to speech module 121 is well known in the art.

22 A more detailed description of voice browser 119 and the associated techniques for
23 enabling users to access the Internet and other networks using a telephone and voice
24 browser is disclosed in U.S. Patent Application Serial No. 09/464,989 entitled "VOICE

1 INTERFACE FOR ELECTRONIC DOCUMENTS,” filed, December 16, 1999, which is
2 incorporated herein by reference. The voice browser of the foregoing patent application
3 can be used with the uniform interface of the invention to enable users to gain access to a
4 wide variety of Internet information by telephone.

5 Server 130 is associated with specific classes of information 131. Information
6 categorized under such classes can be stored on devices including, but not limited to,
7 server 130, remote storage devices, other devices associated with network system 150 or
8 any other device capable of storing data. Server 130 also includes access module 111,
9 which associates HTML code and URIs, received from access devices (e.g. access device
10 110), with specified classes of information 131.

11 Access device 110, in combination with the network architecture illustrated in
12 Figure 1, enables a user to access selected Internet information by depressing the keys that
13 have been correlated with specified classes of information and by listening to the Internet
14 information that is converted from text to speech by text to speech module 121. The
15 method of accessing information begins as a user of access device 110 establishes
16 telephone communication with voice browser 119. The user of access device 110 can then
17 specify a class of information that is desired by depressing one of the alpha-numeric keys
18 134 (e.g., keys 0-9, “*”, and “#”). The user understands that each of the keys correlates to
19 a specified class of information based, for example, on a template that can be overlaid on
20 the keypad, prompts that are read to the user by voice browser 119, or familiarity with the
21 interface from previous usage.

22 In one example of the use of the standardized or uniform interface embodied in the
23 alphanumeric keys 134, the user may know or be informed that key “8” is associated with
24 financial information from the Internet. If the user desires to access financial information,

1 the user depresses the "8" key of access device, resulting in a DTMF signal being
2 generated and transmitted to DTMF conversion module 125 of voice browser 119. DTMF
3 conversion module 125 then converts the DTMF signal (i.e., the "8" signal) to HTML code
4 or to a URI that is to be used by access module 111 of server 130 to access financial
5 information from the Internet.

6 Input module 112 receives HTML code or the URI representing the "8" selection.
7 Correlation module 113 correlates the HTML code or URI into one or more requests for
8 specified classes of information. Correlation module 113 accesses correlation data
9 structure 114 to identify, from among the classes of information 131, the particular class of
10 information to which the "8" selection is correlated. Correlation data structure 114
11 includes data that associates the HTML code or URI for the "8" selection to the
12 corresponding class of information. Based on the foregoing interaction between the
13 various functional components of access module 111, correlation module 113 identifies a
14 URI or another type of address associated with an HTML document that is correlated with
15 the "8" selection made by the user of access device 110. Output module 115 then causes
16 server 130 to service the request for the specified class of information by accessing the
17 HTML document that has been requested.

18 The act of correlating a DTMF signal or the information generated based on the
19 DTMF signal (e.g., HTML code, URI) with a specified class of information can be
20 performed in any of a variety of ways other than that which is depicted in Figure 1. For
21 instance, voice browser 119, rather than access module 111, may include a correlation
22 module 113 that is adapted for identifying the HTML document that is to be transmitted to
23 voice browser 119 in response to the selection by the user of a particular key of access
24 device 110. As used in this document, the term "user selection information" extends to a

1 DTMF signal generated by an access device in response to the user selecting a key of the
2 interface of access device 110, any HTML code or URI generated based on the DTMF
3 signal, and the HTML code or URI generated in response to a user selecting a key on a
4 graphically displayed version of the interface, as will be described in greater detail below.

5 The HTML document that is addressed by the URI identified by correlation module
6 113 may be located in a data storage device associated with server 130, or may be located
7 on a remote Internet server 132. In either case, the appropriate HTML document is
8 retrieved and transmitted to voice browser 119.

9 Server 130 transmits the specified class of information in the form of the HTML
10 document. The transmitted HTML document travels over communication link 127 and is
11 received by text to speech 121. Text to speech 121 parses the HTML code into text and
12 links and converts the HTML code into audio signals, which include the content of the
13 specified class of information. Access device 110 receives the audio signals and audio
14 speaker 118 outputs the specified class of information.

15 **II. Graphical Browser Interface**

16 Figure 2 illustrates an embodiment of the invention including two access devices,
17 access device 210 and access device 260. In this embodiment access device 210 is
18 configured similarly to access device 110 in Figure 1. Access device 210 includes
19 touchpad 216. Touchpad 216, by way of example, and not limitation, is configured
20 similarly to the touchpad on a touchtone telephone or may be configured similarly thereto.
21 Additionally, voice browser 219 is configured similarly to voice browser 119 in Figure 1.

22 Access device 260, is embedded in a computer system, as illustrated in Figure 2, or
23 in another electronics device, such as an Internet appliance or a personal digital assistant,
24 having a graphical display device. Access device 260 includes video display 268, on

1 which icon group 266 can be displayed, which is arranged similarly to touchpad 216.

2 Server 230 is configured similarly to server 130 in Figure 1. Server 230 is
3 associated with specified classes of information 231. Server 230 also includes access
4 module 211. Access module 211 associates HTML source, received from access devices,
5 with specified classes of information 231. Likewise, network system 250 may be any of
6 the network types discussed in reference to network system 150.

7 In the embodiment in Figure 2, access device 210 accesses information in a manner
8 similar to access device 110 in Figure 1. Voice Browser 219 converts an audio signal,
9 such as a DTMF signal, into HTML code. The HTML code is transmitted over
10 communications link 227 and received by server 230. Correlation module 213 correlates
11 the HTML code to cause server 230 to send a specified class of information, also in the
12 form of HTML code, to voice browser 219. Voice browser 219 then converts the HTML
13 source to speech for output on audio speaker 218.

14 On access device 260, selection of icons from icon group 266 causes access device
15 260 to request a specific class of information. However, differing from access device 210,
16 the request can be output directly in the form of HTML code or URIs. The HTML code or
17 URIs are transmitted over communication link 267 and are received by server 230.
18 Communications link 267 may be a standard telephone line, a connection to a LAN or
19 WAN, a direct connection to network 250, or a virtual circuit or channel carried across
20 network 250.

21 If access device 260 generates URIs associated with the requested class of
22 information, server 230 merely services the request using the URI or transmits the request
23 to network system 250, such that the request can be serviced by an appropriate Internet
24 server 232. If access device instead generates a HTML code representing the particular

1 key 2611 that has been selected by the user, server 230 and access module 211 process the
2 HTML code to identify and obtain the corresponding class of information in a manner
3 similar to that described above in reference to HTML code being received by access
4 module 211 in response to input made using access device 210.

5 In particular, in the case in which access module 211 receives HTML code from
6 access device 260 representing a particular key 264 that has been selected, input module
7 212 receives the HTML code. Correlation module 213 then correlates the HTML code
8 into a request for a specified class of information. Correlation module 213 accesses
9 correlation data structure 214 to identify the particular class of information that is
10 correlated with the HTML code. Correlation data structure 214 includes data that
11 associates HTML code to the specified classes of information. Output module 215 then
12 causes server 230 to service the request for the specified class of information.

13 Server 230 then transmits information categorized under the specified class code
14 class in the form of HTML code, over communication link 267. Access device 210
15 receives the HTML code, and information encoded therein is displayed in a visual format
16 on video display 268.

17 Figure 2 illustrates access device 260 and server 230 as distinct devices. However,
18 this is not required; the invention may be practiced with access module 211 and its
19 associated components included as part of access device 260. It may also be the case that
20 the functional components of access module 211 interoperate with each other across one or
21 more other devices included on network system 250 in addition to access device 260 and
22 server 230. Moreover, the operations for correlating the key or icon selections with
23 specified classes of information 231 can be performed in access device 260, a server 230,
24 other networked devices or a combination of the foregoing.

1 A noteworthy feature of the embodiment of Figure 2 is the ability of correlation
2 module 213 to consistently correlate of similar HTML code and, accordingly, into the
3 same specified similar key or icon selections, class of information. In this example,
4 selecting the "3" icon from icon group 266 included in access device 260 results in a
5 request for the same specified class of information as selecting "3" on touchpad 216
6 included on access device 210. While only two access devices are included in Figure 2,
7 any number of access devices can be operably configured to request the same specified
8 class of information upon selection of a corresponding key or icon.

9 Figure 2 further illustrates that access devices need not be similar. Access device
10 210 and access device 260 process different formats of input and output. Access device
11 210 processes audio requests while access device 260 processes the selection of icons on a
12 video display. This is only one example of possible differences; there are a wide variety of
13 differences between the types of access devices that can be used with the invention. The
14 practice of the invention is not limited to any particular combination of differences.

15 The operation of the elements of Figure 2 will now be described with respect to
16 Figure 3, which is a flowchart illustrating how two access devices, of differing
17 configurations, access similar specified classes of information from a server. The method
18 of Figure 3 is illustrated to show how a user can perceive the appearance and response of
19 the user interface of various access devices as being uniform. In act 301, both access
20 device 210 and access device 260 present numeric touchpads with keys of generally
21 similar configuration. In this example, access device 210 displays the keys as part of a
22 touchtone telephone and access device 260 displays the keys as icons on video display 268.

23 In act 302, the keys of both the numeric touchpads are associated with specified
24 classes of information. As seen in Figure 2, associating the keys to specific classes of

1 information can be done in different ways. The keys of access device 210 are associated
2 with specific classes of information with the aid of voice browser 219 and/of access
3 module 211. In contrast, the keys of access device 260 can be associated with specific
4 classes of information using software operating on access device 260. As illustrated,
5 associating the keys to specific classes of information can be performed on an access
6 device or on other devices or modules in communication with an access device.

7 In act 303, similar keys from the numeric touchpad of access device 210 and access
8 device 260 are selected. On access device 210, selections are performed by depressing a
9 key on touchpad 216. On access device 260, selections are performed by selecting an icon
10 from icon group 266. Ways to select an icon include, but are not limited to, using a mouse
11 or other pointing device associated with access device 260 or depressing a key on a
12 keyboard associated with access device 260.

13 In act 304, the selection of similar keys results in access device 210 and access
14 device 260 requesting similar classes of specified information. The request of access
15 device 260 is transmitted in the form of HTML code or a URI. The request of access
16 device 210 request is transmitted as audio tones, (e.g., DTMF tones) which can be
17 converted to HTML code by voice browser 219.

18 In steps 305, and 306 access device 210 and access device 260 receive the specified
19 classes of information that have been requested. Access device 210 outputs the
20 information as audio signals that have been converted form HTML code by voice browser
21 219. Access device 260 directly receives the HTML code and graphically displays the
22 encoded information using a web browser.

III. Example of Classes of Information

Figure 4 is an illustrative example of how particular icons and specified classes of information may be associated with the keys of an interface included in an access device. In this example, the arrangement of the interface is generally similar to that of a touchpad on a touchtone telephone. However, this arrangement is not required for practice of the invention, and the arrangement of the interface may have any of a number of other configurations. Additionally, the particular icons and content associated with the keys are not critical. A key may be associated with any specified class of information otherwise accessible by the access device. Any icon, including a variety of icons not included in Figure 4, may be used to visually represent any specified class of information.

The interface in the example of Figure 4 includes keys 0-9, *, and #. Each of the keys 1 – 9 is associated with a different specified class of information. Key 1 accesses unified messaging, including email, voice mail, fax, etc. Key 2 accesses a news center that can include links to specific Internet news sites. Key 3 accesses a calendar and personal scheduler. Key 4 accesses local information, such as weather, movie listings, etc. Key 5 accesses a content directory that has personalized address lists. This content directory can also include white pages, yellow pages, or other reference Internet sites. Key 6 is a general gateway to the Internet enabling the user to access any web page. Key 7 accesses an e-commerce site where a user may purchase a wide variety of goods and services online. Key 8 accesses a finance portal, which can have links to personalized financial information or financial Internet sites. Finally, key 9 accesses a desktop site, which can include personalized favorites or other such resources.

The remaining three keys, namely *, 0, and # are directional arrows that correspond to buttons used by some graphical browsers. In this embodiment, the * key is a back

1 button, the # key is a forward button, and the 0 key accesses help screens. However,
2 setting keys *, 0, and # to directional arrows is not required, nor is setting the function they
3 perform required. These keys may be set to access specified classes of information as keys
4 1-9 do, or set to perform other Internet functions including, but not limited to, stopping a
5 currently incoming specified class of information, refreshing output of a specified class of
6 information, returning to a home page, or any other Internet function that some graphical
7 browsers may perform.

8 The present invention may be embodied in other specific forms without departing
9 from its spirit or essential characteristics. The described embodiments are to be considered
10 in all respects only as illustrative and not restrictive. The scope of the invention is,
11 therefore, indicated by the appended claims rather than by the foregoing description. All
12 changes, which come within the meaning and range of equivalency of the claims, are to be
13 embraced within their scope.

14 What is claimed and desired to be secured by United States Letters Patent is:
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